Date: 8 June 2000 **0053626**
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Concrete
Subject: Inorganics - Data Package No. H0821-RLN (SDG No. H0821)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0821-RLN prepared by RECRA LabNet (RLN). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0Y0D1	4/20/00	Solid	C	See note 1
B0Y0D2	4/20/00	Solid	C	See note 1
B0Y0D3	4/20/00	Solid	C	See note 1
B0Y0D4	4/20/00	Solid	C	See note 1
B0Y0D5	4/20/00	Solid	C	See note 1
B0Y0D6	4/20/00	Solid	C	See note 1

1- ICP metals - 6010 Supertrace (lead)

Data validation was conducted in accordance with the BHI validation statement of work and "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices to this report provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within six (6) months for ICP metals.

  All holding times were acceptable.

- **Blanks**

  Preparation Blanks

  At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

  In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

  All preparation blank results were acceptable.

- **Accuracy**

  Matrix Spike

  Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

  All matrix spike results were acceptable.

- **Precision**

  Laboratory Duplicate Samples

  Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30%. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ".

  All laboratory duplicate results were acceptable.

  Field Duplicates

  One pair of field duplicate samples (B0Y0D1/B0Y0D6) were submitted for analysis. The samples were compared using the same criteria as laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the CRDLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific CRDL.

- **Completeness**

Data package No. H0821-QES (SDG No. H0821) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0821	REVIEWER: TLI	DATE: 6/8/00	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																					
Laboratory: RECRA																					
Case	SDG: H0821																				
Sample Number		B0Y0D1		B0Y0D2		B0Y0D3		B0Y0D4		B0Y0D5		B0Y0D6									
Location												Duplicate									
Remarks																					
Sample Date		4/20/00		4/20/00		4/20/00		4/20/00		4/20/00		4/20/00									
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Lead	0.5	50.7		58.9		27.0		40.8		24.8		45.1									

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 06/06/00

CLIENT: TMU-HANFORD B00-013 RECRA LOT #: 0004L062

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0Y0D1	Lead, Total	50.7	MG/KG	0.23	1.0
-002	B0Y0D2	Lead, Total	58.9	MG/KG	0.23	1.0
-003	B0Y0D3	Lead, Total	27.0	MG/KG	0.23	1.0
-004	B0Y0D4	Lead, Total	40.8	MG/KG	0.19	1.0
-005	B0Y0D5	Lead, Total	24.8	MG/KG	0.22	1.0
-006	B0Y0D6	Lead, Total	45.1	MG/KG	0.16	1.0

05R

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA
ENVIRONMENTAL
INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report
****REVISION****

Client : TNU-HANFORD B00-013
RFW# : 0004L062
SDG/SAF# : H0821/B00-013

W.O.# : 10985-001-001-9999-00
Date Received: 04-25-00

METALS CASE NARRATIVE

This package was revised to correct the lead result for sample B0Y0D6.

1. This narrative covers the analyses of 6 solid samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

3. All analyses were performed within the required holding times.

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

7. The preparation/method blank (MB) was within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

8. All ICP Interference Check Standards were within control limits.

9. The laboratory control sample (LCS) was within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. The matrix spike (MS) recovery was within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

11. The duplicate analysis was within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

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12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

06-06-00
Date

mld/m04-062

02R

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B00-013-201	Page 1 of 1

Collector: Fahlberg	Company Contact: J Adler / Telephone No.: 373-4316	Project Coordinator: TRENT, SJ	Price Code: 9L / Data Turnaround: 21 Days
Project Designation: 105-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location: 105 DR	SAF No.: B00-013	Air Quality
Ice Chest No.: ERA 94-070	Field Logbook No.: EL 1381-3 / COA: R105D2280C	Method of Shipment: Fed-EX	
Shipped To: TMA/RECRA — RECRA	Offsite Property No.: A000170	Bill of Lading/Air Bill No.: 4235 7953 5383	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Preservation	None	None
Type of Container	aG	aG
No. of Container(s)	1	1
Volume	60mL	60mL
SAMPLE ANALYSIS	ICP Metals - 6010A (Supertrace) (Lead); Mercury - 7471 - (CV)	See item (1) in Special Instructions. (Deleted 4.20.00)

Rat 4.20

C00015

Sample No.	Matrix *	Sample Date	Sample Time										
B0Y0D1	Other Solid	4.20.00	0840	X								B0Y0D7	
B0Y0D2	Other Solid	4.20.00	0850	X								↓	
B0Y0D3	Other Solid	4.20.00	0901	X								↓	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R Fahlberg	4-20-00 1420	R. Thoren / R. Thoren	4.20.00/1420
R. Thoren / R. Thoren	4.24.00/1430	FEDEX	
FedEx	4.25.00 0915	T Boppel	4.25.00 0915

SPECIAL INSTRUCTIONS — Rat 4.21.00

~~(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155);~~ Gamma Spec - Add-on (Barium-133); ~~Isotopic Plutonium; Strontium-89,90 – Total Sr; Technetium-99;~~ Americium-241; Nickel-63; Carbon-14

NOTE: ICP metals - VOID only mercury 7471-(CV) analysis

(1C)

Matrix *: S=Soil, SE=Sediment, SO=Solid, S=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B00-013-202

Collector	Company Contact	Telephone No.	Project Coordinator	Price Code	Data Turnaround
Fahlberg	J Adler	373-4316	TRENT, SJ	9L	21 Days
Project Designation	**Sampling Location**		**SAF No.**	**Air Quality**	
105-F/DR Phase III Below-grade Areas Sampling and Analy	105 DR		B00-013		
Ice Chest No. ERC.99.070	**Field Logbook No.** EL 1381-3	**COA** R105D2280C	**Method of Shipment** Fed-EX		
Shipped To TMA/RECRA RECRA	**Offsite Property No.** A00070		**Bill of Lading/Air Bill No.** 4255 7953 5383		

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	Preservation: None / None	Type of Container: aG / aG	No. of Container(s): 1 / 1	Volume: 60mL / 250mL	ICP Metals - 6010A (Supertrace) (Lead); ~~Mercury 7471 (CV)~~ / See item (*) in Special Instructions.							
B0Y0D4	Other Solid	4.20.00	0910	X										B0Y0D7	
B0Y0D5	Other Solid	4.20.00	0915	X										↓	
B0Y0D6	Other Solid	4.20.00	0840	X											

Rad 4.80

CHAIN OF POSSESSION

Relinquished By	Date/Time	Sign/Print Names	Received By	Date/Time
B. Fahlberg / R. Fahlberg	4.20 4.20.00		R. Thoren	4.20.00/1420
R. Thoren	4.20.00/1420		FED EX	
FedEx	4.25.00 0915		TKappel	4.25.00 0915

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 -- Total Sr; Technetium-99; Americium-241; Nickel-63; Carbon-14

NOTE: ICP metals - VOID only
mercury 7471-(CV) analysis

(1C)

Matrix *
S=Soil
SE=Sediment
SO=Solid
S=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (10/99)

3

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100 DR concrete			DATA PACKAGE: H0821		
VALIDATOR: TLI		LAB: Reena		DATE: 6/1/00	
CASE:			SDG: H0821		

ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐

SAMPLES/MATRIX						
	B0Y0D1	B0Y0D2	B0Y0D3	B0Y0D4	B0Y0D5	B0Y0D6
						Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments:

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	Yes	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	No	N/A
Were ICP serial dilution samples analyzed?	Yes	No	N/A
Are ICP serial dilution %D values acceptable?	Yes	No	N/A
Are field duplicate RPD values acceptable?	Yes	No	N/A
Are field split RPD values acceptable?	Yes	No	N/A

Comments: lead — way off — 1K — ok

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	N/A
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	Yes	No	N/A
Are all results supported in the raw data?	Yes	No	N/A
Are results calculated properly?	Yes	No	N/A
Do results meet the CRDLs?	Yes	No	N/A

Comments:

Recra LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 05/10/00

CLIENT: TWU-HANFORD B00-013 RECRA LOT #: 0004L062

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L1193-MB1	Lead, Total	0.23 u	MG/KG	0.23	1.0

06

Recra LabNet - Lionville

INORGANICS ACCURACY REPORT 05/10/00

CLIENT: TWU-HANFORD B00-013 RECRA LOT #: 0004L062

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	B0Y0D1	Lead, Total	93.9	50.7	50.8	85.0	1.0

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 05/10/00

CLIENT: TWU-HANFORD B00-013 RECRA LOT #: 0004L062

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR (REP)
-001REP	B0Y0D1	Lead, Total	50.7	43.5	15.3	1.0

08

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 05/10/00

CLIENT: TWU-HANFORD B00-013 RECRA LOT #: 0004L062

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	BOY0D1	Lead, Total	50.7	43.5	15.3	1.0

Date: 8 June 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Concrete
Subject: Radiochemistry - Data Package No. H0821-TRC (SDG No. H0821)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0821-TRC which were prepared by ThermoRetec. A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0Y0D1	4/20/00	Solid	C	See note 1
B0Y0D2	4/20/00	Solid	C	See note 1
B0Y0D3	4/20/00	Solid	C	See note 1
B0Y0D4	4/20/00	Solid	C	See note 1
B0Y0D5	4/20/00	Solid	C	See note 1
B0Y0D6	4/20/00	Solid	C	See note 1

1- Gamma spectroscopy; alpha spectroscopy (isotopic plutonium and americium-241); total strontium; nickel-63; carbon-14; technetium-99.

Data validation was conducted in accordance with the BHI validation statement of work and the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- ***Holding Times***

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is

6 months with liquid scintillation requiring analysis within 7 days of distillation.

All holding times were acceptable.

- **Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All laboratory blank results were acceptable.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery is 70-130% (80-120% for gamma spectroscopy). In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to the lack of a matrix spike analysis, all carbon-14 results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than

30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

Field Duplicates

One pair of field duplicate samples (B0Y0D1/B0Y0D6) were submitted for analysis. The samples were compared using the same criteria as laboratory duplicates. The RPDs for strontium (71%) and plutonium-239/240 (151%) were outside QC limits. Under the BHI statement of work, no qualification is required.

- **Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above the PQL: Europium-155 in all samples and europium-154 in samples B0Y0D3 and B0Y0D5. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the analyte-specific PQL.

- **Completeness**

Data Package No. H0821-QES (SDG No. H0821) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the lack of a matrix spike analysis, all carbon-14 results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other

validated results are considered accurate within the standard error associated with the methods.

The following analytes were reported above the PQL: Europium-155 in all samples and europium-154 in samples B0Y0D3 and B0Y0D5. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils.*

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0821	REVIEWER: TLI	DATE: 6/8/00	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Carbon-14	J	All	No matrix spike analysis

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOLID MATRIX, (PCi/G)

Project: BECHTEL-HANFORD																			
Laboratory: TRC																			
Case	SDG: H0821																		
Sample Number		B0Y0D1		B0Y0D2		B0Y0D3		B0Y0D4		B0Y0D5		B0Y0D6							
Location																			
Remarks																			
Sample Date		4/20/00		4/20/00		4/20/00		4/20/00		4/20/00		4/20/00							
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Carbon-14	50	7.05	J	7.50	J	5.11	J	6.61	J	4.79	J	5.18	J						
Nickel-63	30	48.2		60.6		29.7		24.7		38.8		54.3							
Strontium	1	12.4		1.48		0.916		0.792		2.00		5.81							
Technetium-99	15	-0.021	U	-0.015	U	0.087	U	-0.041	U	0.059	U	0.247	U						
Plutonium-238	1	0.040	U	0.014	U	0.009	U	0	U	0.009	U	0.080							
Plutonium-239/240	1	1.95		0.262		0.086		0.171		0.267		0.272							
Americium-241	1	0.254		0.092	U	0.024	U	0.101		0.037	U	0.184							
Potassium-40		11.4		11.0		8.95		12.4		9.55		10.0							
Cobalt-60	0.1	2.02		1.89		1.15		1.14		1.06		1.73							
Barium-133		U	U	U	U	25.3		U	U	10.5		U	U						
Cesium 137	0.1	3.76		3.81		3.53		2.38		1.87		3.12							
Radium-226		0.380		U	U	0.372		0.642		0.359		0.453							
Radium-228		0.826		U	U	U	U	0.711	U	U	U	0.611	U						
Europium-152	0.2	14.1		26.9		12.5		16.4		6.63		14.5							
Europium-154	0.2	2.75		4.09		U	U	1.95		U	U	3.14							
Europium-155	0.1	U	U	U	U	U	U	U	U	U	U	U	U						
Thorium-228	1	0.528		0.465		0.671		0.564		0.388		U	U						
Thorium-232		0.826		U	U	U	U	0.711	U	U	U	0.611	U						
Uranium-235(GEA)		U	U	U	U	U	U	U	U	U	U	U	U						
Uranium-238(GEA)		U	U	U	U	U	U	U	U	U	U	U	U						
Americium-241(GEA)		U	U	U	U	U	U	U	U	U	U	U	U						

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-01 B0Y0D1

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-01	Client sample id	B0Y0D1
Dept sample id	7394-001	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 08:40
% solids	100.0	Custody/SAF No	B00-013-201 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	7.05	2.6	4.1	50	~~J~~ J	C
Nickel 63	13981-37-8	48.2	2.3	2.0	30		NI_L
Total Strontium	SR-RAD	12.4	0.40	0.17	1.0		SR
Technetium 99	14133-76-7	-0.021	0.40	0.89	15	U	TC
Plutonium 238	13981-16-3	0.040	0.035	0.049	1.0	U	PU
Plutonium 239/240	PU-239/240	1.95	0.23	0.034	1.0		PU
Americium 241	14596-10-2	0.254	0.076	0.051	1.0	~~J~~	AM
Potassium 40	13966-00-2	11.4	2.1	1.4			GAM
Cobalt 60	10198-40-0	2.02	0.23	0.17	0.050		GAM
Barium 133	13981-41-4	U		0.18		U	GAM
Cesium 137	10045-97-3	3.76	0.27	0.25	0.10		GAM
Radium 226	13982-63-3	0.380	0.29	0.37	0.10		GAM
Radium 228	15262-20-1	0.826	0.65	0.82	0.20		GAM
Europium 152	14683-23-9	14.1	0.55	0.43	0.10		GAM
Europium 154	15585-10-1	2.75	0.64	0.65	0.10		GAM
Europium 155	14391-16-3	U		0.44	0.10	U	GAM
Thorium 228	14274-82-9	0.528	0.15	0.20			GAM
Thorium 232	TH-232	0.826	0.65	0.82			GAM
Uranium 235	15117-96-1	U		0.53		U	GAM
Uranium 238	U-238	U		26		U	GAM
Americium 241	14596-10-2	U		0.48	1.0	U	GAM

105-P/DR Phase 3 Below-grade Areas..

6/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/19/00

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-02 B0Y0D2

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-02	Client sample id	B0Y0D2
Dept sample id	7394-002	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 08:50
% solids	100.0	Custody/SAF No	B00-013-201 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	7.50	2.6	4.1	50	J	C
Nickel 63	13981-37-8	60.6	2.6	2.1	30		NI_L
Total Strontium	SR-RAD	1.48	0.16	0.13	1.0		SR
Technetium 99	14133-76-7	-0.015	0.14	0.42	15	U	TC
Plutonium 238	13981-16-3	0.014	0.018	0.035	1.0	U	PU
Plutonium 239/240	PU-239/240	0.262	0.076	0.035	1.0		PU
Americium 241	14596-10-2	0.092	0.074	0.099	1.0	U	AM
Potassium 40	13966-00-2	11.0	1.8	1.3			GAM
Cobalt 60	10198-40-0	1.89	0.20	0.17	0.050		GAM
Barium 133	13981-41-4	U		0.19		U	GAM
Cesium 137	10045-97-3	3.81	0.28	0.27	0.10		GAM
Radium 226	13982-63-3	U		0.62	0.10	U	GAM
Radium 228	15262-20-1	U		0.83	0.20	U	GAM
Europium 152	14683-23-9	26.9	0.70	0.55	0.10		GAM
Europium 154	15585-10-1	4.09	0.64	0.57	0.10		GAM
Europium 155	14391-16-3	U		0.47	0.10	U	GAM
Thorium 228	14274-82-9	0.465	0.11	0.16			GAM
Thorium 232	TH-232	U		0.83		U	GAM
Uranium 235	15117-96-1	U		0.53		U	GAM
Uranium 238	U-238	U		24		U	GAM
Americium 241	14596-10-2	U		0.49	1.0	U	GAM

105-F/DR Phase 3 Below-grade Areas..

6/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-03 B0Y0D3

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-03	Client sample id	B0Y0D3
Dept sample id	7394-003	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 09:01
% solids	100.0	Custody/SAF No	B00-013-201 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	5.11	2.5	4.1	50	J	C
Nickel 63	13981-37-8	29.7	2.1	2.1	30		NI_L
Total Strontium	SR-RAD	0.916	0.17	0.19	1.0		SR
Technetium 99	14133-76-7	0.087	0.12	0.39	15	U	TC
Plutonium 238	13981-16-3	0.009	0.017	0.041	1.0	U	PU
Plutonium 239/240	PU-239/240	0.086	0.043	0.041	1.0		PU
Americium 241	14596-10-2	0.024	0.048	0.085	1.0	U	AM
Potassium 40	13966-00-2	8.95	2.1	1.6			GAM
Cobalt 60	10198-40-0	1.15	0.29	0.20	0.050		GAM
Barium 133	13981-41-4	25.3	9.4	12			GAM
Cesium 137	10045-97-3	3.53	0.31	0.26	0.10		GAM
Radium 226	13982-63-3	0.372	0.27	0.33	0.10		GAM
Radium 228	15262-20-1	U		0.96	0.20	U	GAM
Europium 152	14683-23-9	12.5	0.56	0.48	0.10		GAM
Europium 154	15585-10-1	U		0.86	0.10	U	GAM
Europium 155	14391-16-3	U		0.28	0.10	U	GAM
Thorium 228	14274-82-9	0.671	0.15	0.18			GAM
Thorium 232	TH-232	U		0.96		U	GAM
Uranium 235	15117-96-1	U		0.45		U	GAM
Uranium 238	U-238	U		36		U	GAM
Americium 241	14596-10-2	U		0.13	1.0	U	GAM

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6/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
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SAMPLE DELIVERY GROUP H0821

R004161-04 B0Y0D4

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-04	Client sample id	B0Y0D4
Dept sample id	7394-004	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 09:10
% solids	100.0	Custody/SAF No	B00-013-202 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	6.61	2.9	4.5	50	J	C
Nickel 63	13981-37-8	24.7	1.8	1.9	30		NI_L
Total Strontium	SR-RAD	0.792	0.14	0.15	1.0	J	SR
Technetium 99	14133-76-7	-0.041	0.21	0.61	15	U	TC
Plutonium 238	13981-16-3	0	0.010	0.039	1.0	U	PU
Plutonium 239/240	PU-239/240	0.171	0.062	0.039	1.0	J	PU
Americium 241	14596-10-2	0.101	0.057	0.069	1.0	J	AM
Potassium 40	13966-00-2	12.4	2.0	1.4			GAM
Cobalt 60	10198-40-0	1.14	0.20	0.16	0.050		GAM
Barium 133	13981-41-4	U		0.17		U	GAM
Cesium 137	10045-97-3	2.38	0.26	0.26	0.10		GAM
Radium 226	13982-63-3	0.642	0.32	0.39	0.10		GAM
Radium 228	15262-20-1	0.711	0.68	0.86	0.20	U	GAM
Europium 152	14683-23-9	16.4	0.75	0.61	0.10		GAM
Europium 154	15585-10-1	1.95	0.62	0.66	0.10		GAM
Europium 155	14391-16-3	U		0.46	0.10	U	GAM
Thorium 228	14274-82-9	0.564	0.15	0.21			GAM
Thorium 232	TH-232	0.711	0.68	0.86		U	GAM
Uranium 235	15117-96-1	U		0.54		U	GAM
Uranium 238	U-238	U		23		U	GAM
Americium 241	14596-10-2	U		0.50	1.0	U	GAM

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6/2/00

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/19/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-05 B0Y0D5

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-05	Client sample id	B0Y0D5
Dept sample id	7394-005	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 09:15
% solids	100.0	Custody/SAF No	B00-013-202 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	4.79	2.6	4.2	50	UKJ	C
Nickel 63	13981-37-8	38.8	2.2	2.1	30		NI_L
Total Strontium	SR-RAD	2.00	0.18	0.13	1.0		SR
Technetium 99	14133-76-7	0.059	0.22	0.63	15	U	TC
Plutonium 238	13981-16-3	0.009	0.027	0.061	1.0	U	PU
Plutonium 239/240	PU-239/240	0.267	0.075	0.050	1.0		PU
Americium 241	14596-10-2	0.037	0.062	0.11	1.0	U	AM
Potassium 40	13966-00-2	9.55	2.1	1.6			GAM
Cobalt 60	10198-40-0	1.06	0.18	0.13	0.050		GAM
Barium 133	13981-41-4	10.5	6.4	8.4			GAM
Cesium 137	10045-97-3	1.87	0.20	0.19	0.10		GAM
Radium 226	13982-63-3	0.359	0.23	0.28	0.10		GAM
Radium 228	15262-20-1	U		0.76	0.20	U	GAM
Europium 152	14683-23-9	6.63	0.39	0.35	0.10		GAM
Europium 154	15585-10-1	U		0.67	0.10	U	GAM
Europium 155	14391-16-3	U		0.21	0.10	U	GAM
Thorium 228	14274-82-9	0.388	0.14	0.17			GAM
Thorium 232	TH-232	U		0.76		U	GAM
Uranium 235	15117-96-1	U		0.35		U	GAM
Uranium 238	U-238	U		27		U	GAM
Americium 241	14596-10-2	U		0.10	1.0	U	GAM

105-F/DR Phase 3 Below-grade Areas..

6/2/00

Lab id	TMANC
Protocol	Hanford
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TMA / RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-06 B0Y0D6

DATA SHEET

SDG	7394	Client/Case no	Hanford SDG H0821
Contact	Melissa C. Mannion	Contract	TRB-SBB-207925
Lab sample id	R004161-06	Client sample id	B0Y0D6
Dept sample id	7394-006	Location/Matrix	105 DR SOLID
Received	04/25/00	Collected	04/20/00 08:40
% solids	100.0	Custody/SAF No	B00-013-202 B00-013

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Carbon 14	14762-75-5	5.18	2.6	4.1	50	J	C
Nickel 63	13981-37-8	54.3	2.4	2.0	30		NI_L
Total Strontium	SR-RAD	5.91	0.35	0.20	1.0		SR
Technetium 99	14133-76-7	0.247	0.38	0.88	15	U	TC
Plutonium 238	13981-16-3	0.080	0.040	0.038	1.0	J	PU
Plutonium 239/240	PU-239/240	0.272	0.066	0.031	1.0	J	PU
Americium 241	14596-10-2	0.194	0.073	0.077	1.0	J	AM
Potassium 40	13966-00-2	10.0	1.6	1.1			GAM
Cobalt 60	10198-40-0	1.73	0.20	0.15	0.050		GAM
Barium 133	13981-41-4	U		0.14		U	GAM
Cesium 137	10045-97-3	3.12	0.24	0.23	0.10		GAM
Radium 226	13982-63-3	0.453	0.26	0.32	0.10		GAM
Radium 228	15262-20-1	0.611	0.55	0.72	0.20	U	GAM
Europium 152	14683-23-9	14.5	0.54	0.44	0.10		GAM
Europium 154	15585-10-1	3.14	0.55	0.46	0.10		GAM
Europium 155	14391-16-3	U		0.38	0.10	U	GAM
Thorium 228	14274-82-9	U		0.21		U	GAM
Thorium 232	TH-232	0.611	0.55	0.72		U	GAM
Uranium 235	15117-96-1	U		0.44		U	GAM
Uranium 238	U-238	U		20		U	GAM
Americium 241	14596-10-2	U		0.41	1.0	U	GAM

105-F/DR Phase 3 Below-grade Areas..

6/2/00

Lab id	TMANC
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/19/00

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0821 was composed of six other solid samples designated under SAF No. B00-013 with a Project Designation of: 105-F/DR Phase III Below-grade Areas Sampling and Analysis.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. The results were transmitted to BHI via e-Fax on May 15th, 16th, and 19th, 2000.

ANALYSIS NOTES

2.1 Carbon-14 Analyses

No problems were encountered during the course of the analyses.

2.2 Nickel-63 Analyses

No problems were encountered during the course of the analyses.

2.3 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.4 Technetium-99 Analyses

No problems were encountered during the course of the analyses.

2.5 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.6 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.7 Gamma Spec Analyses

No problems were encountered during the course of the analyses.

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B00-013-201	Page 1 of 1

Collector: Fahlberg	Company Contact: J Adler — Telephone No. 373-4316	Project Coordinator: TRENT, SJ	Price Code 9L — Data Turnaround 21 Days
Project Designation: 105-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location: 105 DR H0821 (7394)	SAF No. B00-013	Air Quality ☐
Ice Chest No. ERC96-072	Field Logbook No. EL 1381-3 — COA R105D2280C	Method of Shipment: Fed-EX	
Shipped To: TMA/REGRA RG 4.20.00	Offsite Property No. A000165	Bill of Lading/Air Bill No. 4235 7953 5372	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Preservation	None	None
Type of Container		aG
No. of Container(s)		1
Volume		120mL
SAMPLE ANALYSIS	ICP (lead) - 6010A (Supertrace) (Lead); Mercury-7471A (CV)	See item (1) in Special Instructions.

Delete RG 4.20.00

Sample No.	Matrix *	Sample Date	Sample Time			
B0Y0D1	Other Solid	4.20.00	0840		X	B0Y0D7
B0Y0D2	Other Solid	4.20.00	0850		X	↓
B0Y0D3	Other Solid	4.20.00	0901		X	↓

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By	Date/Time	Received By	Date/Time
R. Geel / R.F.G.	4.20.00 1420	R. Thoren / R. Thoren	4.20.00/1420
R Thoren / R. Thoren	4.24.00 1420	FedEX	4-24-00
Fed Ex	4-25-00 9:30	J.R. Corso / J.RCorso	4-25-00 9:30
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 – Total Sr; Technetium-99; Americium-241; Nickel-63; Carbon-14

FAXED 4/25/00

JC

Matrix *: S=Soil, SE=Sediment, SO=Solid, S=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

E00019

BHI-EE-011 (10/99)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B00-013-202	Page 1 of 1

Collector: Fahlberg	Company Contact: J Adler — Telephone No. 373-4316	Project Coordinator: TRENT, SJ	Price Code 9L — Data Turnaround 21 Days
Project Designation: 105-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location: 105 DR — H0821 (7394)	SAF No. B00-013	Air Quality ☐
Ice Chest No. ERC-96-072	Field Logbook No. EL 1381-3 — COA R105D2280C	Method of Shipment: Fed-EX	
Shipped To: TMA/RECRA RF 4-20-00	Offsite Property No. A000165	Bill of Lading/Air Bill No. 4235 7953 5372	

POSSIBLE SAMPLE HAZARDS/REMARKS: NONE

Special Handling and/or Storage

Preservation	None	None
Type of Container	aG	aG
No. of Container(s)	1	1
Volume	60mL	120mL
SAMPLE ANALYSIS	ICP Metals - 6010A (Supertrace) (Lead); Mercury-7471 (CV) (Deleted RT 4.20.00)	See item (1) in Special Instructions.

020000

Sample No.	Matrix *	Sample Date	Sample Time			
✓ B0Y0D4	Other Solid	4.20.00	0910		X	B0Y0D7
✓ B0Y0D5	Other Solid	4.20.00	0915		X	
✓ B0Y0D6	Other Solid	4.20.00	0840		X	↓

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By	Date/Time	Received By	Date/Time
R. Fahlberg / R.Fahlberg	4-20-00 1420	B. Thorne / B. Thorne	4.20.00/1420
B. Thorne / B. Thorne	4.24.00/1430	FED EX	4-24-00
Fed Ex	4-25-00 9:31	[illegible] JR [illegible]	4-25-00 9:31

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 -- Total Sr; Technetium-99; Americium-241; Nickel-63; Carbon-14

FAXED 4/25/00

JC

Matrix *: S=Soil, SE=Sediment, SO=Solid, S=Sludge, W=Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, WI=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 105D concrete			DATA PACKAGE: H0821		
VALIDATOR: TLI		LAB: TRC		DATE: 6/1/00	
CASE:			SDG: H0821		
ANALYSES PERFORMED					
☐ Gross Alpha/Beta	☐ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☒ LSC		
SAMPLES/MATRIX B04D01 B04D02 B04D03 B04D04 B04D05 B04D06					
					salad

1. Completeness . . . . . ☒ N/A

Technical verification forms present? . . . . . Yes No N/A

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

Initial calibration acceptable? . . . . . Yes No N/A

Standards NIST traceable? . . . . . Yes No N/A

Standards Expired? . . . . . Yes No N/A

Comments: _____

3. Continuing Calibration . . . . . ☐ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:_____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	Yes	No	N/A
Method blank results acceptable?	Yes	No	N/A
Analytes detected in method blank?	Yes	No	N/A
Field blank(s) analyzed?	Yes	No	N/A
Field blank results acceptable?	Yes	No	N/A
Analytes detected in field blank(s)?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:_____

5. Matrix Spikes . . . . . ☐ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments: CCl4 - T all
Ni-63 + Tc99 use trace

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	No	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	(Yes)	No	N/A
Chemical recovery acceptable?	(Yes)	No	N/A
Chemical carrier traceable?	Yes	No	(N/A)
Chemical carrier expired?	Yes	No	(N/A)
Transcription/Calculation errors?	Yes	No	(N/A)

Comments:_____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	(Yes)	No	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:_____

9. Field QC Samples . . . . . ☐ N/A

Field duplicate sample(s) analyzed?	(Yes)	No	N/A
Field duplicate RPD values acceptable?	Yes	(No)	N/A
Field split sample(s) analyzed?	Yes	(No)	N/A
Field split RPD values acceptable?	Yes	No	(N/A)
Performance audit sample(s) analyzed?	Yes	(No)	N/A
Performance audit sample results acceptable?	Yes	No	(N/A)

Comments: SR-7190 QV 235/40 15190

10. Holding Times

Are sample holding times acceptable?	(Yes)	No	N/A

Comments:

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	(Yes)	No	N/A
Results supported in raw data?	Yes	No	(N/A)
Results Acceptable?	(Yes)	No	N/A
Transcription/Calculation errors?	Yes	No	(N/A)
MDA's meet required detection limits?	(Yes)	No	N/A
Transcription/calculation errors?	Yes	No	(N/A)

Comments: 155 all 154 D3-D5

AG

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-08 Method Blank

METHOD BLANK

SDG 7394	Client/Case no Hanford	SDG H0821	
Contact Melissa C. Mannion	Contract TRB-SBB-207925		
Lab sample id R004161-08	Client sample id Method Blank		
Dept sample id 7394-008	Material/Matrix	SOLID	
	SAF No B00-013		

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Carbon 14	14762-75-5	-1.07	2.5	4.3	50	U	C
Nickel 63	13981-37-8	-0.672	1.1	2.0	30	U	NI_L
Total Strontium	SR-RAD	-0.014	0.11	0.15	1.0	U	SR
Technetium 99	14133-76-7	-0.059	0.34	0.48	15	U	TC
Plutonium 238	13981-16-3	-0.013	0.042	0.080	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.008	0.017	0.052	1.0	U	PU
Americium 241	14596-10-2	0.006	0.025	0.045	1.0	U	AM
Potassium 40	13966-00-2	U		0.53		U	GAM
Cobalt 60	10198-40-0	U		0.043	0.050	U	GAM
Barium 133	13981-41-4	U		2.4		U	GAM
Cesium 137	10045-97-3	U		0.036	0.10	U	GAM
Radium 226	13982-63-3	U		0.062	0.10	U	GAM
Radium 228	15262-20-1	U		0.15	0.20	U	GAM
Europium 152	14683-23-9	U		0.082	0.10	U	GAM
Europium 154	15585-10-1	U		0.12	0.10	U	GAM
Europium 155	14391-16-3	U		0.059	0.10	U	GAM
Thorium 228	14274-82-9	U		0.042		U	GAM
Thorium 232	TH-232	U		0.15		U	GAM
Uranium 235	15117-96-1	U		0.089		U	GAM
Uranium 238	U-238	U		4.7		U	GAM
Americium 241	14596-10-2	U		0.081	1.0	U	GAM

105-F/DR Phase 3 Below-grade Areas..

QC-BLANK 34246

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 05/19/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-07 Lab Control Sample

LAB CONTROL SAMPLE

SDG 7394 Client/Case no Hanford SDG H0821

Contact Melissa C. Mannion Case no TRB-SBB-207925

Lab sample id R004161-07 Client sample id Lab Control Sample

Dept sample id 7394-007 Material/Matrix SOLID

SAF No B00-013

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	10500	53	6.3	50		C	11300	450	93	85-115	80-120
Nickel 63	124	3.5	2.1	30		NI_L	133	5.3	93	84-116	80-120
Total Strontium	11.3	0.61	0.26	1.0		SR	11.2	0.45	101	82-118	80-120
Technetium 99	54.2	1.8	0.63	15		TC	54.6	2.2	99	83-117	80-120
Plutonium 238	9.62	0.87	0.073	1.0		PU	9.98	0.40	96	84-116	80-120
Plutonium 239/240	10.8	0.97	0.067	1.0		PU	10.6	0.42	102	83-117	80-120
Americium 241	8.73	0.64	0.057	1.0		AM	9.58	0.38	91	86-114	80-120
Cobalt 60	5.72	0.40	0.19	0.050		GAM	5.82	0.23	98	75-125	80-120
Cesium 137	6.09	0.35	0.25	0.10		GAM	6.38	0.26	95	76-124	80-120

105-F/DR Phase 3 Below-grade Areas..

QC-LCS 34245

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 05/19/00

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0821

R004161-09 B0Y0D2

DUPLICATE

SDG 7394 Client/Case no Hanford SDG H0821

Contact Melissa C. Mannion Case no TRB-SBB-207925

DUPLICATE ORIGINAL

Lab sample id R004161-09 Lab sample id R004161-02 Client sample id B0Y0D2

Dept sample id 7394-009 Dept sample id 7394-002 Location/Matrix 105 DR SOLID

Received 04/25/00 Collected 04/20/00 08:50

% solids 100.0 Custody/SAF No B00-013-201 B00-013

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Carbon 14	4.06	2.6	4.1	50	U	C	7.50	2.6	4.1	J	60	98
Nickel 63	60.6	2.5	2.0	30		NI_L	60.6	2.6	2.1		0	23
Total Strontium	1.60	0.18	0.16	1.0		SR	1.48	0.16	0.13		8	32
Technetium 99	-0.008	0.29	0.30	15	U	TC	-0.015	0.14	0.42	U	-	
Plutonium 238	0.023	0.028	0.036	1.0	U	PU	0.014	0.018	0.035	U	-	
Plutonium 239/240	0.224	0.067	0.036	1.0	J	PU	0.262	0.076	0.035	J	16	63
Americium 241	0.133	0.089	0.11	1.0	J	AM	0.092	0.074	0.099	U	36	155
Potassium 40	11.3	1.9	1.5			GAM	11.0	1.8	1.3		3	47
Cobalt 60	2.12	0.24	0.17	0.050		GAM	1.89	0.20	0.17		11	40
Barium 133	U		0.19		U	GAM	U		0.19	U	-	
Cesium 137	3.98	0.32	0.31	0.10		GAM	3.81	0.28	0.27		4	36
Radium 226	U		0.71	0.10	U	GAM	U		0.62	U	-	
Radium 228	U		0.93	0.20	U	GAM	U		0.83	U	-	
Europium 152	28.0	0.80	0.62	0.10		GAM	26.9	0.70	0.55		4	32
Europium 154	3.56	0.58	0.57	0.10		GAM	4.09	0.64	0.57		14	47
Europium 155	U		0.52	0.10	U	GAM	U		0.47	U	-	
Thorium 228	0.496	0.19	0.25			GAM	0.465	0.11	0.16		6	76
Thorium 232	U		0.93		U	GAM	U		0.83	U	-	
Uranium 235	U		0.59		U	GAM	U		0.53	U	-	
Uranium 238	U		28		U	GAM	U		24	U	-	
Americium 241	U		0.55	1.0	U	GAM	U		0.49	U	-	

105-F/DR Phase 3 Below-grade Areas..

QC-DUP#2 34247

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 05/19/00

Review Comment Record (RCR)

1. Date	2. Review No.
06/14/00	QA-0031
3. Project	4. Page
105-F/DR	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. W0H0821	105-F/DR Phase III Below grade Sampling and Analysis - Concrete	Claude Stacey	Quality Program	372-9208

17. Comment Submittal Approval:

Organization Manager (Optional) _____ Date _____

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

11. CLOSED

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: OK No Comments.			
2	Inorganic: Page 03, Field Duplicates has the duplicate samples as B0YD01/B0Y0D6. This should be B0Y0D1/B0Y0D6.			
3				

Rich Weiss's comment for H0821.
No other comments

30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

Field Duplicates

One pair of field duplicate samples (B0Y0D1/B0Y0D6) were submitted for analysis. The samples were compared using the same criteria as laboratory duplicates. The RPDs for strontium (71%) and plutonium-239/240 (151%) were outside QC limits. Under the BHI statement of work, no qualification is required.

- **Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above the PQL: Europium-155 in all samples and europium-154 in samples B0Y0D3 and B0Y0D5. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the analyte-specific PQL.

- **Completeness**

Data Package No. H0821-QES (SDG No. H0821) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the lack of a matrix spike analysis, all carbon-14 results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other

Data validation results:			
Validator:	DWS		
Date:	6/12/2000		
Projects:	ERDF Leachate Delisting Analysis		
SAFs	B00-013		
SDGs:	H0821		
data package	**analysis**	**page**	**comment**
	Inorganics		no observations
H0821	Rad	10	several listed CRDLs in the summary table are different (or not listed) from those defined in DOE/RL-99-35, Rev 0, Table 2.2: Co60 @ 0.05pCi/g, Ra226 @ 0.1, Ra228 @ 0.2, Eu152 &154 @ 0.1, Eu155 @ 0.05, Th232 @1, U235 & 238(GEA) @ 0.1 and Am(GEA) @ 0.1.
H0821	Rad	3	Under the section "detection levels", the following analytes appear to be reported above the CRDL: U235, U238, and Am241 in all samples (required MDL 0.1pCi/g), Ra226 in sample B0Y0D2, Ra228 in samples B0Y0D2, B0Y0D3, B0Y0D4, B0Y0D5, and B0Y0D6. In addition, real numbers appear to be reported for Ra228 and Th232 that are below the laboratory's stated MDL for B0Y0D4 and B0Y0D6.

Review Comment Record (RCR)

1. Date	2. Review No.
06/11/00	QA 0031
3. Project	4. Page
105-F/DR	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
SDG No. W0H0821	105-F/DR Phase III Below grade Sampling and Analysis - Concrete	Claude Stacey	Quality Program	372-9208

10. Comment Submittal Approval

Organization Manager (Optional) / Date

10. Agreement with incorporated comment disposition(s)

Reviewer/Point of Contact

11. CLOSED

06/06/00
Date

Reviewer/Point of Contact

Author/Originator

Author/Originator

12. Item	13. Comment(s), Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14 Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry: OK. No Comments.			
2	Inorganic: Page 03, Field Duplicates has the duplicate samples as B0Y00 /B0Y005. This should be B0Y0DU/B0Y0D6.		Correct Ke	
3				

Data validation results:			
Validator:	DWS		
Date:	6/12/2000		
Projects:	ERDF Leachate Delisting Analysis		
SAFs	E0C-013		
SDGs:	H0821		
data package	**analysis**	**page**	**comment**
	Inorganics		no observations
H0821	Rad	10	several listed CRDLs in the summary table are different (or not listed) from those defined in DOE/RL-98-05, Rev 0, Table 2.2 Co60 @ 0.05pCi/g, Ra226 @ 0.1, Ra228 @ 0.2, Eu152 & 154 @ 0.1, Eu155 @ 0.05, Th232 @1, U235 & 238(GEA) @ 0.1 and Am(GEA) @ 0.1.
H0821	Rad	3	Under the section "detection levels", the following analytes appear to be reported above the CRDL: U235, U233, and Am241 in all samples (required MDL 0.1pCi/g), Ra226 in sample B0Y0D2, Ra228 in samples B0Y0D2, B0Y0D3, B0Y0D4, B0Y0D5, and B0Y0D6. In addition real numbers appear to be reported for Ra228 and Th232 that are below the laboratory's stated MDL for B0Y0D4 and B0Y0D6

DQLs have been used per BHI instructions.

6/15/00

Ken Weiss's Comment for H0821
No other Comments

30 percent, the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

Rec 6/19/00

Field Duplicates

One pair of field duplicate samples (B0Y0D1/B0Y0D6) were submitted for analysis. The samples were compared using the same criteria as laboratory duplicates. The RPDs for strontium (71%) and plutonium-239/240 (151%) were outside QC limits. Under the BHI statement of work, no qualification is required.

- **Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above the PQL: Europium-155 in all samples and europium-154 in samples B0Y0D3 and B0Y0D5. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the analyte-specific PQL.

- **Completeness**

Data Package No. H0821-QES (SDG No. H0821) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the lack of a matrix spike analysis, all carbon-14 results were qualified as estimates and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other

TRANSMISSION RESULT REPORT (JUN 15 '00 12:56PM)

BHI S&D MANAGEMENT 509 372 9487

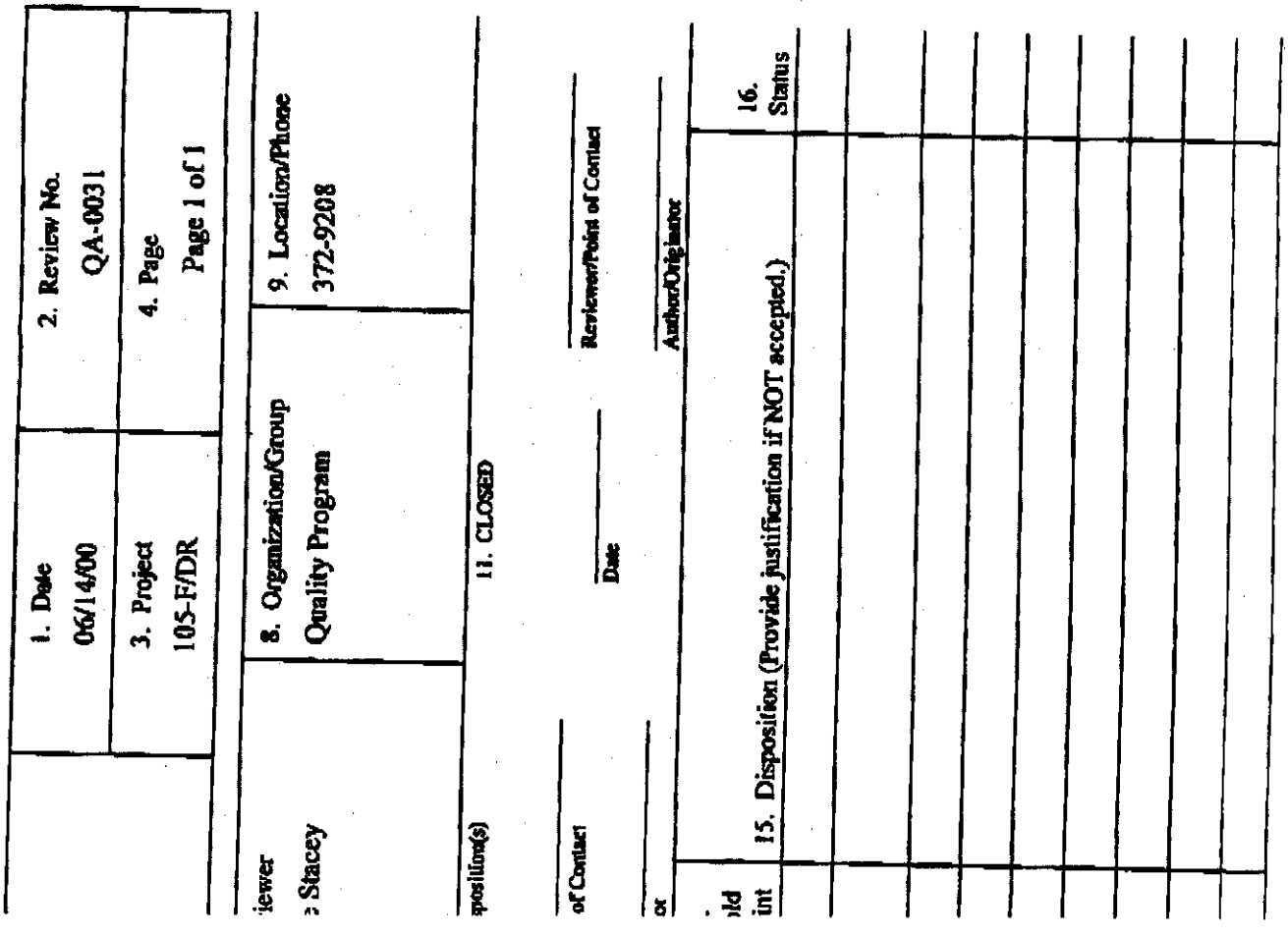
(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
027	MEMORY TX		3755151	03/03	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION



FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 1 June 2000

Information Request #3

H0821 - Metals

Are you sure that sample B0Y0D6 is a duplicate of B0Y0D1?. The analytical result for D1 is 50.7 MG/KG while that for D6 is 50.7 MG/KG, which would indicate more than just a slight precision problem.

TRANSMISSION RESULT REPORT (JUN 01 '00 09:08AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
032	MEMORY TX		3755151	21/21	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

Jun-01-00 09:04A JUN 01 '00 08:23AM P.02

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 1 June 2000

Information Request #2

U0821 - Rail

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 1 June 2000

Information Request #2

110821 - Rad

Were matrix spikes analyzed for the three LSC analytes?

No MS performed for C-14. Proceed with validation.

MS not required for Ni-63 & Tc-99, both methods have yield monitoring (Tracer for Tc-99, carrier for Ni-63). Proceed with validation

RZ Weiss 6-1-00

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 1 June 2000

Information Request #2

110821 - Rad

Were matrix spikes analyzed for the three LSC analytes?

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 1 June 2000

Information Request #1

H0821 - Rad

The samples in the package (B0Y0D1-D6) are not listed in the VSR.